

(19) **United States**(12) **Patent Application Publication**  
**Pedersen**(10) **Pub. No.: US 2003/0031404 A1**(43) **Pub. Date: Feb. 13, 2003**(54) **OPTICAL TRANSMISSION SYSTEMS  
INCLUDING OPTICAL COMPONENTS AND  
OPTICAL FILTERS AND METHODS OF USE  
THEREIN****Publication Classification**(51) **Int. Cl.<sup>7</sup> ..... G02B 6/28; G02B 6/26**(52) **U.S. Cl. .... 385/24; 385/15**(75) **Inventor: Bo Pedersen, Annapolis, MD (US)**

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**stein Drive, P.O. Box 9400 21046-9400**(21) **Appl. No.: 09/923,909**(22) **Filed: Aug. 7, 2001**(57) **ABSTRACT**

Optical transmission systems of the present invention includes at least one double pass Mach Zehnder filter, which includes a first optical coupling section coupling at least one input/output port to a first end of two or more optical communication paths, or Mach-Zehnder legs, having different effective lengths. A second optical coupling section is provided to couple at least one output/input port to a second end of the optical communication paths. The first and second optical coupling sections and the two communication paths form a Mach-Zehnder interferometer. The double pass Mach-Zehnder filter is configured such that the output from at least one of the output/input port is coupled back into one of the one output/input ports and passes through the Mach-Zehnder interferometer a second time.

